

I am fully agreed that Mackensie is correct when he makes the statement that "some of the most violent attacks of angina pectoris have occurred in people in whom the exhaustion of the heart was temporary, and the restoration of reserve force resulted in a complete cessation of pain and in permanent recovery." Some of these I have treated with small doses of strychnine and 0.3 grain doses of lactate of lime.

In the treatment of both hypertension and arteriosclerosis we receive valuable indications from the consideration of the general condition of our patients and the constitutional treatment accordingly administered. With associated renal complications and anemia the chlorides are particularly valuable. We must continue to keep before our mental vision the urgent necessity of conveying to the heart and the entire system the pabulum which it demands, including an abundance of oxygen.

The life of the Venetian Doge Cornaro who presented a discourse on "The Art of Living Long" has never ceased to interest me. It is a classic and should claim your attention. Cornaro had, I dare say, subjected himself to overwork, and possibly to many other baneful influences, in spite of which he reached his eighty-third year. He appreciated the fact that he had made many mistakes, and that he was fast nearing his end. His later experience justified the production of a series of articles, "Wherein the Author details the Method by which he Corrected his Infirm Condition and Strengthened his Naturally Weak Constitution and Thenceforth Continued in the Enjoyment of Perfect Health." He lived to be over one hundred years old, enjoying to his last day the full possession of his faculties and many other pleasures which he was quite sure he would not have enjoyed had he disobeyed the laws of Nature. A single quotation is justified: "Divine sobriety, pleasing to God, the friend of Nature, the daughter of reason, the sister of virtue, the companion of temperate living, the loving mother of human life, the true medicine both of soul and body, how much should men praise and thank thee for thy courteous gifts, for that gives them the means of preserving life in health, that blessing which it did not please God we should have a greater in this world, life and existence so naturally prized, so willingly guarded by every living man." This paragraph contains the essence of therapy which the thinking physician must apply against hypertension, whatever the cause.

THE TONIC USE OF DIGITALIS.

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THE diagnosis of the disturbances of the different functions of the heart muscle has made tremendous strides under the influence of Mackenzie's graphic method of recording the heart movements and Wenckebach's ingenious application of Gaskell and Engelmann's explanations of physiological phenomena. Studies in the disorders due to disturbed conductivity have opened a new chapter in the seemingly exhausted subject of the pathology of the heart. We now interpret the alternating pulse as a sign of disturbed contractility, and the disorders of excitability and rhythmicity are rapidly becoming identified. The rational therapy of the future will have to aim at the correction of these primordial disturbances, and modern pharmacology will have to rise to the demand for the various specifics. Unfortunately, tonicity, the most important function of the heart muscle from a clinical standpoint, cannot be directly recorded or estimated. Its variations must be gauged by a study of the functional disturbances due to impaired circulation. Stretching of the muscle and distention of the ventricular cavities follow necessarily on a loss in tonicity, and the result is a retardation of the blood stream.

The influence of the tonus on the efficiency of the heart muscle may be appreciated from the following observations: It has been shown that the ventricle does not empty itself completely with each systole. It fills during diastole with a varying amount of blood, depending mainly upon the length of diastole and the strength of the forces which aspirate the blood into the heart. We know also that a muscle can do most work when it is slightly stretched. Thus, with a good tonicity, the strength of contraction of a given heart muscle will vary directly with the amount of diastolic filling of the ventricle. Also, as the capacity of the ventricle varies as the cube of the diameter, less shortening of the muscle is needed to expel a given quantity of blood from a well-filled than from a poorly-filled cavity. If, however, the stretching of the muscle be due to a loss of tonicity, even an increase in contractility cannot prevent a loss in the amount of work done. This can be shown in the laboratory by loading a muscle and stretching it beyond the limit of its tonicity. In this condition it can perform very little work.

There is still another way in which a loss of tonicity interferes with the action of the heart. Under normal conditions ventricular systole begins with an increase of tonus, which raises the pressure in

the cavities to that of the pulmonary arteries and the aorta before any shortening of the muscle has taken place. Thus, with the opening of the valves, muscular contraction begins under the most favorable conditions of tonicity and load.

These conditions are changed just as soon as any one of the heart valves begins to leak. The escape of blood allows the ventricle to change its shape at the very beginning of systole, there is no rise in tonicity, and the fibers begin to contract too soon. The contraction, which should be afterloaded, becomes isotonic, that is, the amount of work performed is practically equal throughout the duration of contraction, and much more energy is used up.

The lack of isometric contraction preceding the isotonic contraction can be overcome to a considerable extent by an increased diastolic filling of the ventricle. This stretches the muscle enough to raise the tonicity appreciably before the beginning of systole. A shorter contraction is then needed to expel the usual amount of blood. This compensatory process soon tends to become harmful, as the overstretching of the heart muscle lowers tonicity still further.

It is its influence on this vital function of tonicity which has given digitalis its unique position in the therapy of cardiac disorders. As far back as 1882, François Frank showed that digitalis strengthens the muscular rings which are largely responsible for the competency of the auriculoventricular valves. The relative mitral insufficiency seen in various conditions of depression—*anemia*, cardiac overstrain, and failing compensation—is due to a loss of tone in this ring, and can be influenced favorably by digitalis. Since Frank's publication, numerous investigators, notably Cushny and Cameron, have come to the same conclusion, and Gossage has tried to prove that this effect on tonicity constitutes the entire beneficial action of digitalis. This view, however, is probably not wholly justified. Balfour¹ says: "All the benefits we obtain from digitalis are inseparably connected with its tonic action; they flow from the power that digitalis has of increasing muscular elasticity, and the improved metabolism of all the tissues, but especially of the myocardium."

The effect of digitalis upon the heart depends upon the amount of the drug present in the body. In fully developed heart failure, with dilatation, enlargement of the liver, and *œdema*, we give digitalis in massive doses. Accumulation takes place owing to the comparatively slow excretion, and the body becomes saturated. Then appear the toxic as well as the beneficial effects of digitalis. The slower pulse and longer diastole, due to vagus action, permit a more complete recuperation of the contractile power, and the deep and more forceful inspirations, due to stimulating of the respiratory centre, aid in the diastolic filling of the ventricles. The dose of digitalis

¹ Clinical Lectures on Diseases of the Heart, p. 360.

must be adapted to the rate of its excretion if we want to get the effect on tonicity alone. This rate has been found by Balfour to be about 1 grain in twelve hours. Accumulation does not take place with this dose, and the drug may thus be given over periods of weeks, months, and even years without any toxic action.

This valuable point in the art of giving digitalis has received scant mention in the literature of the subject. Most of the experimental work has been done on normal animals, and with toxic doses. In this way many errors have been introduced into the clinical application of digitalis; for instance, the action on the peripheral vessels which appears only with toxic doses.

Cloetta² has made some excellent studies in this use of "tonic" doses in contradistinction to the "anti-asthmatic doses" of Huchard. First, he took normal animals and gave digitalis in increasing doses for periods varying between a few months and two years. There was no change in the pulse frequency, and measuring the blood pressure during compression of the aorta showed no increase in the ability of the heart to overcome the obstruction. Autopsies showed no change in the weight or size of the heart. The result of the experiment was very different, however, when performed on animals with an aortic insufficiency produced by the Rosenbach method. The hearts of the control animals which received no medication showed an increase in weight of 47 per cent. over the normal average, while the hearts of the treated animals showed an increase of only 25 per cent. The work-output of the digitalis heart muscle was vastly greater, however, than that of the controls.

Four of the control animals died of heart failure, while none of the treated animals showed any symptoms of heart disease. The functional test—blood pressure during compression of the aorta—showed practically normal records with the treated, and much lower figures with the control animals.

We see from these experiments that the larger hypertrophy gives a poorer functional result. This can probably be explained in the following way: The loss of tone is a stimulus to hypertrophy, which, however, cannot make up entirely for the original loss. Digitalis helps the muscle to keep its tone; less hypertrophy is demanded, and the new muscle is again enabled to work more effectively.

With the great development of our modern methods of physical diagnosis, the tendency has been to rely too much on the direct examination of the heart. As stated at the beginning of this paper, we must look elsewhere for the first signs of failing tonicity, and if we wait for indications from the heart itself, we will need the massive doses to get out of danger. Neither will blood pressure determinations help us, as they offer no means of measuring accurately the systolic output of the heart. Plesch's³ procedure, which seems to be

² Archiv f. exp. Path. und Pharm., lix.

³ Ztschr. f. exp. Path. und Ther., vi.

the only one giving any degree of accuracy, is hardly applicable clinically.

Loss of tonicity shows itself first in general symptoms. In the presence of heart disease, persistent cough with rales over the basis of the lungs may be attributed to a loss of tonicity of the left ventricle. A similar condition on the right side of the heart shows itself first in the swelling of the liver, dyspeptic symptoms, and slight pitting of the ankles, which disappears over night. When these symptoms coincide with the appearance of a mitral or tricuspid murmur, all indications are present for the tonic doses of digitalis.

The tonic use of digitalis in cardiac disease is of comparatively recent introduction. The cumulative, toxic effect from repeated small doses seemed so inevitable as to prohibit any such continued medication. Traube was the first to see a way out of the difficulty, and he showed that digitalis could be used over long periods in slowly increasing dosage. A little more attention was paid to the subject when Baelz⁶ reported the remarkable case of a woman who had taken an infusion of digitalis for seven years. While taking the drug she was able to work, but any attempt to stop was followed by diminution in the amount of urine, oedema, flashes of light, tinnitus aurium, and subjective heart symptoms, which would disappear within a few hours after resuming treatment. In the course of seven years she took 810 grams of digitalis.

Balfour in England, Fraentzel⁵ in Germany, and Huchard⁴ in France have been pioneers in this field.

Balfour, in his lectures, discusses the subject so fully and so well, that very little has been added since. More recently, Groedel,⁷ Naunyn,⁸ and Kussmaul⁹ have insisted on the advantages of this method. Kussmaul has given us, in his usual classic style, a most complete and accurate account of a case in which autopsy showed the following conditions: Generally dilated heart, stenosis and insufficiency of the aortic valves, aneurysm of the aorta, arteriosclerosis and endarteritis of the coronaries, and contracted kidneys. He first took digitalis in 1892 on account of oedema and dyspnoea, and from that time until his sudden death in 1899 he continued its use in daily doses. During that time he travelled extensively, and was in fairly good health. Occasionally, after some unusual strain the dose had to be increased for a few days to obtain satisfactory diuresis, but the protective action of digitalis gave him a comfortable range of effort, and he suffered from none of the usual phenomena

⁴ Archiv f. Heilkunde, 1876.

⁵ Charité Annalen, 1868, Vorlesungen über die Krankheiten des Herzens.

⁶ Les Maladies du Cœur.

⁷ Verhandlungen des Congresses f. innere Medicin, 1899.

⁸ Therapie der Gegenwart, 1899.

⁹ Ibid.

of heart disease. According to accurate records kept during the seven years, he took in that time 305 grams of digitalis.

As these are the only publications I can find on the use of digitalis in tonic doses, I feel justified in communicating my experience in this subject, collected from a large number of cases observed over a period of several years.

Looking over the records of these cases, I can distinguish two groups which have different prognoses and treatment. In the first group are the valvular lesions of rheumatic origin. It is principally in these cases that we derive the full benefit from the tonic action of digitalis. Then, the lesion once established, the heart has to overcome a certain constant resistance. An alteration in the compensatory mechanism is demanded only with an intercurrent infection, rheumatic or otherwise.

In the second group are the myocardial and arteriosclerotic cases, in which the pathological processes are progressive. The heart has to increase its work constantly to compensate for the increasing loss of tonicity, to keep up excretion in the contracting kidney, and to overcome the high blood pressure.

Let me first consider the valvular lesions. In my series these are all at the mitral valve, and in most of them the stenosis is the preponderant factor. A typical example may be found in the following case:

CASE I.—Mr. M., aged forty-two years, came under my care on September 19, 1908. He had had two attacks of rheumatic fever fourteen and eight years previously, and five years ago he had an attack of gonorrheal rheumatism. Ever since that time he has been conscious of his heart, and gets out of breath easily. Nevertheless, he continued his usual mode of life, filling a very responsible and strenuous position by day, drinking and smoking very heavily at night. In December, 1907, he had an attack of influenza, which left him weak and not fully recovered. In the following June he noticed swelling of the legs and abdomen, and dyspnoea appeared. Jaundice had developed a few days before I saw him.

A diagnosis was made of mitral stenosis and insufficiency and tricuspid insufficiency. The pulse was permanently irregular—about 140 per minute; the blood pressure, difficult of estimation on account of the irregularity, was approximately 160 systolic, and 110 diastolic (von Recklinghausen, water pressure).

The patient received 0.7 gram of digitalis in the next four days. It was then discontinued, as the pulse had dropped to 60, with the onset of an enormous diuresis. At that time an early diastolic murmur could be heard; also a distinct reduplication of the pulmonic second sound. Though kept in bed all the time, œdema reappeared on October 9, with rales over the bases of the lungs. Digitalis was resumed, 0.1 gram being given daily. The result can be seen in the following table:

Date.	Digitalis.	Fluids. (24 Hours) Ounces.	Urine. Ounces.	Specific gravity.
October 2		24	30	1018
" 3		34	34	1020
" 4		36	40	1014
" 5		36	34 $\frac{1}{2}$	1014
" 6		36	44	1014
" 7		46	29	1016
" 8		36	35	1017
" 9	0.1	36	33	1016
" 10	0.1	42	32	1017
" 11	0.1	42	42	1015
" 12	0.1	36	40	1017
" 13	0.1	39	53	1012
" 14	0.1	36	62	1011
" 15	0.1	46	45	1012
" 16	0.1	39	36	1018

Note that the digitalis action appeared on the 11th, the third day of the treatment. The heart now seemed to be well compensated; the œdema had disappeared, and he was able to go about his business.

On October 29 some œdema reappeared, with enlargement of the liver. The dose of digitalis was immediately increased to 0.3 gram, with an increase in the diuresis and a dropping of the pulse rate to 68 next day; 0.2 gram was given that day, and the day after the usual daily dose was resumed. When seen on November 20, the heart was well compensated; there was a strong apex beat; pulse 68, no œdema. Blood pressure: systolic, 160; diastolic, .85. The pulse remained permanently irregular. On December 3 slight œdema of the legs appeared, and on the 6th the dose was again increased to 0.3 gram; 0.2 gram was given on the 7th, and on the 8th the regular dose was resumed. Diuresis and disappearance of the œdema followed on the 7th.

Since then the patient has remained well, attending to his business, and he has been fully compensated, except on two occasions, when some physical overstrain brought on swelling of the liver and slight œdema. On both occasions the disturbance yielded on the second day to the usual increase of digitalis. He has now been taking 0.1 gram of digitalis regularly every day for twenty months, and we see the typical result of such treatment. A heart which failed under the slightest provocation (October, 1908) has been toned up so that the patient has been able to attend to all of his duties without any symptoms of failing compensation.

Such experience has taught me to follow up the cumulative doses by tonic doses of digitalis in every case in which a rheumatic valvular lesion has led to heart failure. As soon as the full digitalis effect is obtained, usually on the second or third day, I give 0.1 gram and continue this as long as the patient is under my care. In this way I have kept a number of advanced cases fully compensated for many years.

As stated earlier in this article, tonic doses may be used to great advantage when slight œdema, and enlarged liver, and a decrease in the urinary excretion point to an imminent failure of compensation. I usually combine the treatment with rest in bed and restriction of food to 1000 c.c. of milk a day for a period of three to six days.

Let me now consider the value of this treatment in the second group of cases—the myocardial and arteriosclerotic. The prognosis in arteriosclerosis is not nearly so favorable as in valvular cases, especially if a complete breakdown has already taken place. The constant strain of the enormous peripheral resistance, and the direct interference with nutrition tend to a progressive diminution in the activity of the heart muscle. Thus, failure of compensation may appear with very little warning during the treatment, and there is none of the security felt in the valvular cases, where a break comes only after some unusual strain. When a break comes, the usual increase in dosage is demanded. On resuming the daily dose, however, we often find that 0.1 gram twice a day is needed. Soon even this will not postpone the day of reckoning, and larger doses are out of the question on account of cumulative phenomena.

This subject is well illustrated by the following history:

CASE II.—Mr. B., aged fifty years, a schoolteacher. During the last four to five years he has had occasional attacks of shortness of breath, which has become almost permanent in the last four months, and is aggravated at times by a dry, hacking cough. Considerable œdema has appeared in the last four weeks. Examination showed chronic nephritis, hypertrophy and dilatation of the left ventricle, mitral and tricuspid insufficiency, œdema of the legs, and swelling of the liver. Blood pressure was 240 systolic, 160 diastolic (von Recklinghausen); pulse, 121, regular.

Compensation was secured in six days with restriction of food to 800 c.c. of milk, and the use of 0.8 gram of digitalis leaves. The pulse fell to 80, and the blood pressure to 170 systolic and 85 diastolic. He was dismissed from treatment May 15, but returned on June 13, with œdema of the legs; pulse, 104; blood pressure, 221 systolic, 165 diastolic. He was given 10 drops of digalen three times a day until July 10, when it was discontinued, as there was no change in his condition. Full digitalis action was then obtained with the powdered leaves, 0.3 gram on the first day, 0.2 gram on the second and third, and 0.1 gram on the succeeding days. This time he remained well and fairly compensated for nearly a year. On October 14 his pulse was 84; blood pressure, 210 systolic, 125 diastolic, and there was no œdema. About this time he had two short attacks, with anginoid symptoms.

On May 15 of the next year he returned with considerable œdema of the legs; pulse, 120, slightly irregular; blood pressure, 210 systolic, 160 diastolic; heart considerably dilated, and the liver 5 cm. below

the costal margin. He was given 0.8 gram of digitalis in the next four days, with the usual result of diuresis and disappearance of the œdema. After this it was found necessary to give 0.2 gram daily. This preserved a balance for about four weeks, when the œdema returned, and death followed in a few days.

In the second group of cases there is one other symptom to be watched for with the œdema, the enlargement of the liver, and the rales, and that is gallop rhythm. Lately, Müller¹⁰ has again insisted on the importance of this as a sign of beginning failure, and an indication for the use of digitalis. I have followed this rule for several years with very satisfactory results. We practically never see this symptom with purely valvular lesions.

The following practical points should be observed in the use of digitalis in tonic doses:

Nothing is more important than that the digitalis should be physiologically active. Focke,¹¹ Gottlieb,¹² and Fraenkel¹³ have repeatedly urged the necessity for standardized preparations, and anyone who has seen the absolute inertia of the usual infusions, tinctures, and digitalins will heartily agree with them. Only three preparations are available for tonic administration. Groedel, in his first publication, advocated digalen, which is supposed to be digitoxin, and without any cumulative action. Fraenkel showed that digalen has the same cumulative action as any other preparation if given in corresponding doses. I have discarded digalen, because it has often failed to produce any effect when afterward another preparation succeeded—just as I observed in the second case reported herewith. Balfour has used Nativelle's digitoxin granules with excellent results, and I also have found them very reliable. The dose is 0.00025 gram every day, and the action becomes marked after ten to fourteen days.

For some time now I have prescribed almost exclusively Allen's English digitalis leaves in doses of 0.1 gram a day, and concur with Janeway¹⁴ in praising their uniform and reliable action. Secondary effects are rare, and I do not remember a single case in which the drug had to be stopped on account of stomach symptoms. In an experience of several years, I have seen but one instance of cumulative action with the daily dose of 0.1 gram. That occurred in Case I. herewith recorded, who developed the following symptoms after using the drug a year. There was a progressive slowing of the pulse from 80 to 68, and long silences of three to four seconds would be followed by a series of rapid contractions. The patient felt uneasy, was dizzy, and there was a considerable diminution in the

¹⁰ Münch. med. Woch., 1908.

¹¹ Berlin. klin. Woch., 1906; Archiv der Pharmacie, 1903.

¹² Zur Theorie der Digitaliswirkung, Med. Klinik, 1906.

¹³ Ergebnisse der innere Medicin, vol. i.

¹⁴ AMER. JOUR. MEE. SCI., 1908, cxxxv, 781.

amount of urine. These symptoms disappeared upon stopping the digitalis. Such action can be avoided easily by giving the drug only three weeks out of four.

Probably the main reason why the tonic use of digitalis has not become popular is that men have feared that the body would accustom itself to the drug, so that the dose would have to be increased, and finally, there would be no action at all. Practical experience has shown that in purely valvular cases this does not occur; on the contrary, the dose may have to be reduced later, as described in the preceding paragraph. In the second group of cases, the dose had to be increased to 0.15 or 0.2 gram a day, but this was due to the progressive character of the process. Such an increase is shown graphically in the record of digitalis taken yearly by Kussmaul's patient.

Year.	Grams.
1892	15.00
1893	41.65
1894	35.10
1895	39.20
1896	44.48
1897	49.08
1898	57.86
To March 29, 1899	22.92

Experience has shown also that cumulative doses have exactly the same effect on patients who have been under tonic treatment as they have in similar cases in which digitalis is used for the first time.

We frequently have to consider the advisability of combining other drugs with digitalis. Many writers advise the giving of vasodilators to counteract the constrictor effect of digitalis. It is high time that we discard this hoary tradition and look squarely at the facts in the case. As mentioned at the beginning of this article, most of the work done on digitalis was with toxic doses, and vasoconstriction is one of the toxic effects. It has been shown clinically that in the majority of patients with beginning digitalis effect the blood pressure falls. Conclusive proof that digitalis in clinical doses relaxes the peripheral vessels has been given by O. Müller¹⁵ and his pupils, who showed with the plethysmograph that there is a constant increase in the volume of blood in an extremity after the use of digitalis.

The increase in blood pressure so frequently seen in failing compensation, even in mitral disease, seems to be due largely to the dyspnoea. The giving of digitalis leads to better ventilation of the lungs; more oxygen for the respiratory centre, and secondarily a fall in blood pressure.

Regular weekly to monthly determinations in all my cases have shown that the tonic use of digitalis has no tendency to increase the

¹⁵ Verhandlungen des Congresses f. innere Medicin, 1909.

blood pressure, but, on the contrary, a fall in the systolic pressure can often be noted coincident with an improvement in the general condition of the patient. Iodide has been used in conjunction with digitalis when it was deemed advisable. In anemic cases, when the general nutrition is badly affected, I have found the combination with arsenous acid very efficacious, and it may succeed when digitalis alone would fail.

CONCLUSIONS. 1. Digitalis acts as a specific on the tonicity of the heart muscle, and is indicated whenever symptoms point to a failure of that function.

2. Its tonic effects are best secured with a dose equal to the amount excreted—about 0.1 gram a day—though doses of 0.15 and 0.2 gram a day sometimes can be taken for weeks without the appearance of cumulative effects.

3. Loss of tonicity is shown first by general symptoms—rales over the bases of the lungs, enlargement of the liver, and slight œdema of the ankles.

4. Digitalis is indicated, therefore, whenever these symptoms appear, and especially in cases in which the patient, after recovering from a severe break in compensation, shows a tendency to fail on the slightest exertion.

THE TREATMENT OF TYPHOID FEVER.¹

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ETIOLOGY. Typhoid fever, which is one of the commonest diseases in our experience, but less common than in the experience of our medical fathers, thanks to the interest elicited by the work of the research scholar and an awakened sense of civic responsibility, is due to the invasion of the body by a definite bacterium, *Bacillus typhosus* of Eberth. The gross lesions are referable to the intestinal canal, but they are to be looked upon merely as local expressions of a general infection, just as lobar pneumonia is but a localization in the lung of an organism that infects the whole body. This is an important therapeutic concept, as it directs our attention to the individual as a whole and spares us useless effort to medicate the intestinal canal, in the hope of curing the disease. The mortality varies in different epidemics and varies in private and hospital practice, but on the whole is in the neighborhood of 15 per cent.

THERAPY. We are dealing with a self-limited disease, the cure of which depends on the elaboration of specific bodies by the tissue cells of the patient, a result we have not yet been able to duplicate

¹ A lecture delivered at the Cornell University Medical College.

in the laboratory. This does not mean that we cannot influence the course of the disease. On the contrary, a considerable fall in mortality has come about as the result of skilled care, conscientious watchfulness, competent nursing, and the application of definite measures to the relief of symptoms and complications.

REST. It would seem almost superfluous in a disease of such import as typhoid fever to insist on rest, but it must be remembered that the onset is slow, and in mild cases, or what at the beginning promises to be a mild case, the patient is prone to look upon it as an indisposition, and the physician may be uncertain of his diagnosis, and in the meantime the patient is on his feet, perhaps attempting to attend to his business, or at least protesting against the bed. These cases are the so-called "walking typhoids." Statistics have shown that these cases do not do as well as those receiving attention promptly, and it is probable that what might have been a mild typhoid attack has been converted, by lowering the resistance of the patient, into a severe or fatal case.

Where, then, suspicion is aroused as to the possibility of typhoid fever, the patient should not be permitted to waste his precious strength while one is awaiting the development of diagnostic symptoms or the result of blood examinations. He should be put to bed at once and prepared for what is likely to be a long siege. Real rest can be obtained only by careful and competent nursing, by the exclusion from the sickroom of all business cares and causes for anxiety, and refusal to make the sickroom a reception room for solicitous friends.

The patient is not to leave the bed to go to the toilet, or even to use a commode, but the bed-pan is to be insisted on. This trouble comes in the early days of the fever. It will be a source of argumentation and contention, but one's dictum must be firm, backed up by a few words of explanation. The need for rest, the need of sparing the tissues useless oxidation, is emphasized by the length of the disease.

BED. While remembering to conserve the strength of the patient, it must not be forgotten that the strength of the attendant ought to be economized, and in no way can this be done to better advantage than in selecting a bed on which the patient can be readily handled. The ideal bed is the half-bed, or single bed, of a convenient height, with strong woven wire springs and a firm springy mattress. A folded blanket will render the surface smooth. Over the blanket, is to be placed a sheet, a rubber sheet, and a draw sheet. Sheets should be drawn smooth, for freedom from wrinkles and dryness and cleanliness are great factors in preventing discomfort, and, in very sick patients, the formation of bedsores. Over the patient a sheet and a light blanket is sufficient; and one low pillow, not too soft, makes for comfort. The upper sheet should not be drawn too tightly over the feet of the patient, as is often done to improve the appearance of the bed, to the patient's great discomfort.